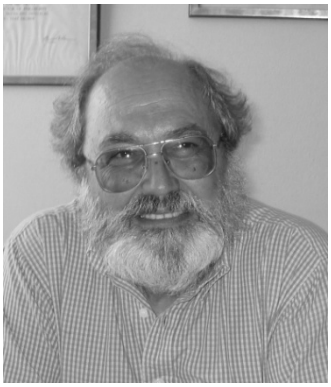
Keynote Speakers

"Engineering proper tissues and organs: the cells require ALL the appropriate signals"

Wednesday 5 October 2011
09:00-09:30



Prof. Yannis F. Missirlis
Laboratory of Biomechanics and Biomedical Engineering
Mechanical Engineering & Aeronautics Dept.
University of Patras

Abstract

Understanding the cell processes is a prerequisite for designing a comprehensive system for tissue engineering products. Cells seem to have a cohort of mechanisms to sense, access, and respond to internal and environmental cues for their proper function. The particular importance of mechanical signals will be discussed.

Curriculum Vitae

Professor Missirlis received his B.S. degree in Chemical Engineering, July 1969, from the National Technical University of Athens, Greece, his M. Sc. in Chemical Engineering, June 1971, from the Syracuse University, and his Ph.D. degree in Chemical Engineering, December 1973, from Rice University. He is currently Research Associate, at the Department of Surgery, Baylor College of Medicine. Professor Yannis F. Missirlis pioneered Educational and Research activities in Greece in the areas of Biomechanics, Biomaterials, Biomedical Engineering and Regenerative Medicine. In the early 1980s he represented his country in the European Union in the scientific areas of Biotechnology, and Biomedical Engineering. He has been a founding member and a Council member of the World Council of Biomechanics (1994-2006). At the same time he has served as member of the Council of the European Society of Biomechanics (1994-2002) responsible for the Award Committee and the Education Committee. Prof. Missirlis has been invited and given seminars , or invited plenary talks, apart from European and North American Educational and Research Establishments, to scientific audiences in China, India, Iran, Syria, Argentina, Brazil, Cuba, Venezuela, Siberia (Russia). Professor Missirlis has authored more than 70 papers.

Wednesday 5 October 2011
14:00-14:45

Prof. Metin Akay
Department of Biomedical Engineering
Cullen College of Engineering
University of Houston

Curriculum Vitae

Metin Akay received his B.S. and M.S. in Electrical Engineering from the Bogazici University, Istanbul, Turkey in 1981 and 1984, respectively and a Ph.D. degree from Rutgers University in 1990. He is currently the founding chair of the new Biomedical Engineering Department and the John S. Dunn professor of biomedical engineering at the University of Houston. He has played a key role in promoting biomedical education in the world by writing and editing several books, editing several special issues of prestigious journals, including the Proc of IEEE, and giving several keynote and plenary talks at international conferences, symposiums and workshops regarding emerging technologies in biomedical engineering.

He is the founding editor-in-chief of the Biomedical Engineering Book Series published by the Wiley and IEEE Press and the Wiley Encyclopedia of Biomedical Engineering. He is also the editor of the Neural Engineering Handbook published by Wiley/IEEE Press and the first steering committee chair of the IEEE Trans on Computational Biology and Bioinformatics.

He established the Annual International Summer School on Biocomplexity from Gene to System sponsored by the NSF and the IEEE EMBS and is the founding chair of the IEEE EMBS Special Topic Conference on Neural Engineering. He is also the chair of the IEEE EMBS Neuroengineering Technical Committee. He was the program chair of the International IEEE EMBS 2001 and the co-chair of the International IEEE EMBS 2006.

He currently serves on the advisory board of several international journals including the IEEE T-BME, IEEE T-ITIB, Smart Engineering Systems etc. and furthermore serves on several NIH and NSF review panels

Dr. Akay is a recipient of the IEEE EMBS Early Career and Service awards as well an IEEE Third Millenium Medal and is a fellow of IEEE, the Institute of Physics (IOP), the American Institute of Medical Biological Engineering(AIMBE) and the American Association for the Advancement of Science (AAAS). His Neural Engineering and Informatics Lab is interested in developing an intelligent wearable system for monitoring motor functions in Post-Stroke Hemiplegic Patients and detecting coronary artery disease. In addition, his lab is currently investigating the effect of nicotine on the dynamics of ventral tegmental area (VTA) dopamine neural networks.

"From Falls Prevention to Vision Restoration: Medical Device Technologies for Improving Quality of Life"

Thursday 6 October 2011
08:30-09:00

Prof Nigel Lovell
Graduate School of Biomedical Engineering
University of New South Wales
UNSW Sydney NSW 2052 Australia

Abstract

A number of medical device technologies developed in our laboratories over the past two decades, aimed at relieving the burden of disease and improving quality of life will be explored. These devices, include telehealth monitoring and decision support systems for chronic disease management; wearable ambulatory technologies based around triaxial accelerometry for falls detection and falls risk prevention; and neuroprosthetic devices to provide some form of restoration for lost sensory function.

Fall-related injuries impose a huge burden on the health care budget and constitute a significant cause of morbidity and mortality in the older population. In recent years, falls detection technologies have become more prevalent. However, there are very few commercially available offerings due to the high incidence of false positive alarms in the unsupervised environment. Our group has been working on the use of altimetry as measured by a barometric pressure sensor, combined with triaxial accelerometry, to significantly improve the reliability of falls detection systems. In addition, we will describe how we have adopted a self-administered directed-routine (DR) to provide a means of accurately assessing falls risk in the free-living environment.

Implantable device technologies for treating sensory loss will also be detailed. Specifically, for over a decade our research group have been working on a retinal neurostimulator - a so-called "bionic eye". Our work towards realising human trials of a visual prosthesis will be discussed, including the general principle of operation, design challenges and potential benefits for implant recipients.

Curriculum Vitae

Nigel Lovell received the B.E. (Hons) and Ph.D. degrees from the University of New South Wales (UNSW), Sydney, Australia. He is currently Professor of Biomedical Engineering with the Graduate School of Biomedical Engineering. He has authored 300+ refereed journals, conference proceedings, book chapters and patents, and been awarded over $68 million in R&D and infrastructure funding. His research work has covered areas of expertise ranging from cardiac modeling, telehealth technologies, biological signal processing, and visual prosthesis design. Through a spin-out company from UNSW, TeleMedCare Pty. Ltd., he has commercialised a range of telehealth technologies for managing chronic disease and falls in

the older population. He is also one of the key researchers leading an R&D program to develop an Australian bionic eye.

Prof. Lovell was the IEEE Engineering in Medicine and Biology Society (EMBS) Vice President (VP) for Conferences (2004/2005 and 2010/2011) and VP for Member and Student Activities (2002/2003). He was the conference co-chair for the 2003 World Congress in Medical Physics and Biomedical Engineering, held in Sydney Australia, scientific co-chair for the Annual IEEE EMBS conference in Lyon France in 2007, and was awarded the IEEE Millennium Medal for services to the EMBS and the profession.

"Clinical Assessment of the Motion of the Lumbar Spine and of Resistance to Fatigue of the Spinal Muscles"

Friday 7 October 2011
08:30-09:00

Prof. Robert Allen
Professor of Biodynamics and Control
Institute of Sound and Vibration Research
University of Southampton

Abstract

Low back pain is a very common problem, particularly in industrialised countries. In addition to the enormous cost to the economy, the scale of the misery arising is considerable. Mechanical damage is often felt to be an underlying cause of the pain and, certainly, lumbar spine instability is a topic of much current interest. Determination and characterisation of instability is, however, fraught with problems, not least being the difficulty if observing spine motion.

Traditional measures of spine shape and motion are based upon non-invasive, surface methods, typically using reflected light, or use ionising radiation to obtain evidence of vertebral positions in plain X-ray images. Surface measures are unable to characterise inter-segmental kinematics and X-ray images can only be obtained in a very limited number of positions due to the high radiation dosage. Digital videofluoroscopy (DVF) creates the possibility of capturing motion since the X-ray dosage is considerably lower than for plain images. The penalty for this reduction is, however, a much reduced image quality and this, coupled with a much greater number of images from a motion sequence, creates a difficult image processing problem. Manual marking and analysis of images is time consuming, tedious and error prone.

This paper gives an overview of methods developed to measure the motion of the spine clinically and to characterise the kinematics. The focus is on the processing of DVF image sequences and on recent research aimed at tracking the vertebral bones and quantifying the spinal motion for the clinician to use in diagnosis and in following the progress of treatment. Current research on the assessment of the resistance to fatigue of the spinal muscles will also be described aimed at monitoring members of the marine rescue services during transits at sea.

Curriculum Vitae

Honorary Editor of the journal Medical Engineering and Physics (http://www.elsevier.co.uk) Founding Editor-in-Chief of the journal Biomedical Signal Processing & Control (http://www.elsevier.co.uk) Founding Editor-in-Chief of the journal Bioinspiration & Biomimetics: Learning from Nature (http://www.iop.org/EJ/bioinsp)

Member of the Mechatronics, Informatics & Control Committee (Institution of Mechanical Engineers) He is a Fellow of the Institution of Electrical Engineers, the Institution of Mechanical Engineers and the Institute of Physics and Engineering in Medicine.

Research Interests

Research interests are currently focused on the development and application of signal processing techniques for biomedical systems analysis and bioinspired acoustic and control systems. Particular biomedical interests include: efficient estimation of auditory evoked potentials for assessment of hearing and of depth of anaesthesia, cerebral hydrodynamic modelling and non-invasive assessment of intracranial compliance, and processing of fluoroscopic images for measurement of spine kinematics. Increasingly personalised home monitoring is being developed, particularly for patients suffering from cardiovascular disease.

Biographical Data

Robert Allen holds a Personal Chair in Biodynamics and Control at the Institute of Sound and Vibration Research (ISVR), University of Southampton, UK. Following training in the machine tool industry and a period as numerical control programme engineer (Dean, Smith & Grace Ltd., in collaboration with IBM UK) he studied at the University of Leeds and graduated with BSc (Hons) in Control Engineering and was awarded a PhD for research on modelling the dynamic characteristics of neural receptors. This was followed by Postdoctoral positions at the University of Leeds (Dept. Anaesthesia) on monitoring intracranial pressure of severely head-injured patients to prevent secondary brain damage, and at the Welsh National School of Medicine, Cardiff (Dept. Anaesthetics) on a parameter estimation approach to non-invasive measurement of cardiac output.

He moved to the University of Southampton (Faculty of Medicine) in 1984 to a newly-created position as Lecturer in Biocomputation, and from there to the Department of Mechanical Engineering in 1985 as Lecturer and Senior Lecturer in Control Engineering and to the ISVR in 1997.